

schweber

glos'sa-ry of  
com-put'er &  
in'te-gra'ted  
cir'cuit terms

**ACTIVE ELEMENTS:**

Those components in a circuit which have gain or which direct current flow: diodes, transistors.

**ADDER:**

Switching circuits which generate sum and carry bits.

**ADDRESS:**

A code designating the location of information and instructions in the main storage unit of the computer.

**ANALOG COMPUTER:**

A continuous-variable computer, or non-digital computer. A differential analyzer. Measures the effect of changes in one variable on all other variables in a system. Its operation is analogous to a slide rule.

**AND:**

A Boolean logic operator analogous to multiplication. Of two variables, both must be true for the output to be true.

**ASYNCHRONOUS:**

Operation of a switching network by a free-running signal which triggers successive instructions; the completion of one instruction triggers the next.

**"BLACK BOX":**

A useful mathematical approach is an electronic circuit which concerns itself only with its inputs and output, and ignores the internal elements, discrete or integrated.

**BINARY:**

A system of numerical representation which uses only two symbols, 0 and 1.

**BIT:**

Abbreviation for Binary Digit.

**BUFFER:**

A non-inverting member of the digital family which may be used to handle a large fan-out or to convert input and output levels. Normally a buffer is an emitter-follower type of circuit.

**CERMET:**

A material used in making thin film resistive elements. The first half of the term is derived from ceramic and the second half from metal.

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**CHIP:**

A single substrate on which all the active and passive elements of an electronic circuit have been fabricated utilizing the semiconductor technologies of diffusion, passivation, masking, photoresist, epitaxial growth. A chip is not ready for use until it is packaged and provided with terminals for connection to the outside world. Also called a die.

**CLEAR:**

To restore a memory or storage device to a "stand-ard" state, usually the "zero" state. Also called Reset.

**CLOCK:**

A pulse generator which controls the timing of switching circuits and memory states, and equals the speed at which the major portion of the computer operates.

**CML: CURRENT-MODE-LOGIC:**

Operates in the unsaturated mode as distinguished from all the other forms which operate in the saturated mode.

**COUNTER:**

(a) A device capable of changing states in a specified sequence upon receiving appropriate input signals; (b) a circuit which provides an output pulse or other indication after receiving a specified number of input pulses. (Specific counters follow.)

**COUNTER, BINARY:**

A Flip-Flop having a single input. Each time a pulse appears at the input, the Flip-Flop changes state; called a "T" Flip-Flop.

**COUNTER, RING:**

A loop or circuit of interconnected Flip-Flops so arranged that only one is "on" at any given time and that as input signals are received, the position of the "on" state moves in sequence from one Flip-Flop to another around the loop.

**DCTL: DIRECT-COUPLED-TRANSISTOR LOGIC:**

Logic is performed by transistors.

**DECIMAL:**

A system of numerical representation which uses ten symbols 0, 1, 2, 3, . . . . 9.

**DELAY:**

Undesirable delay effects are caused by rise time and fall time which reduces circuit speed, but intentional delay units may be used to prevent inputs from changing while clock pulses are present. The delay time is always less than the clock pulse interval.

**DIFFUSION:**

A thermal process which introduces tiny amounts of impurities into the base material. A difficult process in solids though quite easy in fluids. Just drop a bit of coloring matter in a glass of water and the color will very gradually distribute itself throughout the water.

**DIGITAL CIRCUIT:**

A circuit which operates like a switch, that is, it is either 'on' or 'off'.

**DIGITAL COMPUTER:**

A discrete-variable computer which counts separate units.

**DISCRETE:**

Electronic circuits built of separate, finished components.

**DTL: DIODE-TRANSISTOR-LOGIC:**

Logic is performed by diodes. The transistor acts as an amplifier; and the output is inverted.

**EPITAXIAL GROWTH:**

A chemical reaction in which silicon is precipitated from a gaseous solution, and grows upon the surface of a silicon wafer present in the gaseous solution.

**EXCLUSIVE "OR":**

The output is true if either of two variables is true, but *not* if both are true.

**FALL TIME:**

A measure of the time required for a circuit to change its output from a high level (1) to a low level (0).

**FAN-IN:**

The number of inputs available on a gate.

**FAN-OUT:**

The number of gates that a given gate can drive. The term is applicable only within a given logic family.

**FEB:**

Acronym for Functional Electronic Block. Another name for a monolithic integrated circuit.

**FLIP-FLOP:**

An electronic circuit having two stable states, and having the ability to change from one state to the other upon the application of a signal in a specified manner. See specific types below.

**FLIP-FLOP, "D":**

D stands for delay. A flip-flop whose output is a function of the input which appeared one pulse earlier, that is, if a 1 appears at its input, the output a pulse later will be a 1.

**FLIP-FLOP, "J-K":**

A flip-flop having two inputs designated J and K. At the application of a clock pulse, a 1 on the J input will set the flip-flop to the 1 or "on" state; a 1 on the K input will reset it to the 0 or "off" state, and 1's simultaneously on both inputs will cause it to change state regardless of what state it had been in.

**FLIP-FLOP, "R-S":**

A flip-flop having two inputs designated R and S. At the application of a clock pulse, a 1 on the S input will set the flip-flop to the 1 or "on" state, and 1 on the R input will reset it to the 0 or "off" state. It is assumed that 1's will never appear simultaneously at both inputs.

**FLIP-FLOP, "R-S-T":**

A flip-flop having three inputs, R, S, and T. The R and S inputs produce states as described for the R-S flip-flop above; the T causes the flip-flop to change states.

**FLIP-FLOP, "T":**

A flip-flop having only one input. A pulse appearing on the input will cause the flip-flop to change states.

**GATE:**

A circuit having two or more inputs and one output, the output depending upon the combination of logic signal at the inputs. There are four gates called: AND, OR, NAND, NOR. The definitions below assume positive logic is used.

**GATE, AND:**

All inputs must have 1-state signals to produce a 1-state output.

**GATE, NAND:**

All inputs must have 1-state signals to produce an 0-state output.

**GATE, NOR:**

Any one input or more having a 1-state signal will yield an 0-state output.

**GATE, OR:**

Any one input or more having a 1-state signal is sufficient to produce a 1-state output.

**GIGO:**

An acronym used to describe a computer whose operation is suspect. (Garbage in, garbage out.)

**HALF SHIFT REGISTER:**

Another name for flip-flop.

**HOLE:**

An electron vacancy; an unfilled state in a valance-band of electrons. A positive charge.

**HYBRID:**

A method of manufacturing integrated circuits by using a combination of the monolithic and thin film methods.

**IMPURITIES:**

Material added to silicon or germanium in order to create a P-type section or N-type section. Examples of impurities: boron, phosphorous, arsenic.

**INTEGRATED CIRCUIT:**

The Electronic Industries Association defines semiconductor integrated circuit as — "the physical realization of a number of electrical elements inseparably associated on or within a continuous body of semiconductor material to perform the functions of a circuit".

**INVERTER:**

The output is always in the opposite logic state of the input. Also called a NOT circuit.

**ION:**

When an atom which is electrically neutral acquires one or more additional electrons, or loses one or more of its electrons, the resulting state of charge is called an ion.

**JUNCTION:**

A junction is formed when an N-type crystal is brought into close contact with a P-type crystal creating a boundary between them.

**LINEAR CIRCUIT:**

A circuit whose output is an amplified version of its input, or, whose output is a pre-determined variation of its input.

**LOGIC:**

A mathematical approach to the solution of complex situations by the use of symbols to define basic concepts, also called Symbolic Logic. The three basic logic symbols are "and", "or", and "not". When used in Boolean Algebra these symbols are somewhat analogous to addition and multiplication.

**MEMORY:**

A storage device into which information can be inserted and held for use at a later time.

**MICROCIRCUIT:**

Another name for integrated circuits.

**MICROELECTRONICS:**

Another name for integrated circuits.

**MONOBRID:**

A method of manufacturing integrated circuits by using more than one monolithic chip within the same package.

**MONOLITHIC:**

"One-stone." A single flat-surfaced chip of silicon onto which patterns may be drawn, scribed, diffused, etc., the result being a simple chip of material into whose surface has been formed transistors, diodes, resistors and capacitors.

**MULTIPLE CHIP:**

Another name for hybrid type circuit manufacture.

**NEGATIVE LOGIC:**

The reverse of POSITIVE LOGIC.

**"NOT":**

A Boolean logic operator indicating negation. A variable designated "not" will be the opposite of its "and" or "or" function. A switching function for only one variable.

**"OR":**

A Boolean operator analogous to addition. (Except that two truths will only add up to one truth.) Of two variables, only one need be true for the output to be true.

**PARALLEL OPERATION:**

Pertaining to the manipulation of information within computer circuitry, in which the digits of a word are transmitted simultaneously on separate lines. Faster than serial operation, but requires more equipment.

**PASSIVE ELEMENTS:**

Those components in a circuit which have no gain characteristics: capacitors, resistors, inductors.

**POSITIVE LOGIC:**

The more positive voltage (or current level) represents the 1-state; the less positive level represents the 0-state.

**PROPAGATION DELAY:**

A measure of the time required for a change in logic level to propagate through a chain of circuit elements.

**PULSE:**

A change of voltage or current of some finite duration and amplitude. The duration is called the pulse width or pulse length; the magnitude of the change is called the pulse amplitude or pulse height.

**RCTL: RESISTOR-CAPACITOR-****TRANSISTOR-LOGIC:**

Same as RTL except that capacitors are used to enhance switching speed.

**REGISTER:**

A device used to store a certain number of digits within the computer circuitry, often one word. Certain registers may also include provisions for shifting, circulating, or other operations.

**RISE TIME:**

A measure of the time required for a circuit to change its output from a low level (0) to a high level (1).

**RTL: RESISTOR-TRANSISTOR-LOGIC**

Logic is performed by resistors. The transistor produces an inverted output from any positive input.

**SERIAL OPERATION:**

Pertaining to the manipulation of information within computer circuitry, in which the digits of a word are transmitted one at a time along a single line. Though slower than parallel operation its circuitry is considerably less complex.

**SHIFT REGISTER:**

An element in the digital family which utilizes flip-flops to perform a displacement or movement of a set of digits one or more places to the right or left. If the digits are those of a numerical expression, a shift may be the equivalent of multiplying the number by a power of the base.

**SIMULATION:**

Testing contingent proposals on computers in advance of implementation.

**SKEWING:**

Refers to time delay or offset between any two signals.

**SLEWING RATE:**

Refers to rate at which output can be driven from limit to limit over the dynamic range.

**SYNCHRONOUS:**

Operation of a switching network by a clock pulse generator. Slower and more critical than asynchronous timing but requires less and simpler circuitry.

**THIN FILM:**

A method of manufacturing integrated circuits by depositing thin layers of materials to perform electrical functions; usually only passive elements are made this way.

**TTL: TRANSISTOR-TRANSISTOR-LOGIC:**

A modification of DTL which replaces the diode cluster with a multiple-emitter transistor.

**WORD:**

The term "word" denotes an assemblage of bits considered as an entity in a computer.

**SOURCES:**

*Most of the information contained in this glossary was obtained from the literature of microcircuit manufacturers, particularly Fairchild, General Electric, Motorola, and Westinghouse.*



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